

Space Science Enterprise Performance Targets and Indicators

Target 1S1: Successfully develop and launch no less than three of four planned missions within 10% of budget and schedule.

Performance indicators have been identified for four missions scheduled to launch in FY01. Indicators have also been established for other missions in development.

- GALEX Development: Deliver the Galaxy Evolution Explorer (GALEX) for launch; successful launch and check-out.
- MAP Development: Deliver the Microwave Anisotropy Probe (MAP) for launch; successful launch and check-out.
- GP-B Development: Deliver GP-B for launch; successful launch and check-out.
- CATSAT Development: Deliver the Cooperative Astrophysics and Technology Satellite (CATSAT) for launch; successful launch and check-out.
- SIRTF Development: Spacecraft complete and ready for integration with Cryogenic Telescope Assembly (CTA). CTA complete and delivered to spacecraft contractor for integration with spacecraft.
- SOFIA Development: Install Protoflight 747 Cavity Door on Section 46 Cavity Mockup.
- HST Development: Install two key HST upgrades on Servicing Mission 3B: Advanced Camera for Surveys (ACS) and Solar Array 3 (SA3).
- Payload & Instrument Development – Planck: The Preliminary Breadboard Cooler Performance Report will be delivered.
- Explorer Program Future Missions: MIDEX 3&4: Throughout FY 2001, continue full-scale development of the Swift Gamma Ray Burst Explorer (Swift) and the Full-sky Astrometric Mapping Explorer (FAME). SMEX 8&9: Down-selection planned.

Target 1S2: Obtain expected scientific data from 80% of operating missions.

Performance indicators have been identified for six operating missions. An indicator has also been established for another mission scheduled to launch in FY01; this indicator is to be utilized upon successful launch.

- HST Operations: Maintain an average on-target pointing efficiency of 35%, excluding the servicing mission and checkout and verification period.
- CXO Operations: Instruments meeting nominal performance expectations; complete 80% of pre-planned and commanded observations with 95% of science data recovered on ground.
- RXTE Operations: Successful operation of the Proportional Counter Array, the High Energy X-ray Timing Experiment, and the All-Sky Monitor instruments, with an average of 3 PCUs (proportional counter units) operating at 45% efficiency or higher; 90% of data recovered; ASM data posted on the web within 7 days.
- ACE Operations: Measure the composition and energy spectra of heavy nuclei in six solar energetic particle events; measure the frequency and composition of coronal mass ejection events during the year; maintain real-time solar wind data 90% of the time.
- FUSE Operations: Measure interstellar gas velocities as small as 15 km per second, make 200 independent observations on line of sight in the Milky Way and nearby Galaxies; deliver 95% of the calibrated science observations to the FUSE archive on time.

- SWAS Operations: Dedicate 6000 hours (on-source plus reference positions) to observations of galactic star forming regions, asymptotic giant branch stars, planetary nebulae, supernovae remnants, planets, and comets.
- MAP Operations: Conduct early operations, including achieving the required trajectory to L2; interrupt sky-scanning observing mode no more than 4 times per year; successfully dump data daily to DSN with transfer to GSFC.

Target 1S3: Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in astronomy rocket and balloon flights, and by making satisfactory research progress in related Research and Analysis (R&A) and Data Analysis (DA) programs.

Performance indicators have been drawn from technology development objectives for three missions. Indicators have also been established for achievement of mission success for astronomy rocket and balloon flights and research progress in the R&A and DA programs.

- NGST Technology Development: Inflatable Shield in Space (ISIS) technology demonstration ready to fly on Shuttle; release AO for Science Instrument; down-select to a single phase 2 prime contractor.
- FIRST Technology Development: Complete the qualification mirror (QM) fabrication.
- GLAST Technology Development: Conduct successful NAR for instrument development, project definition, and interface development.
- Sounding Rocket Flights: Achieve launch success rate of 80% for sounding rocket flights.
- Balloon Flights: Achieve launch success rate of 80% for balloon flights.
- Research and Analysis: Issue NASA Research Announcement (NRA) for Research Opportunities in Space Science (ROSS).

Target 1S4: Successfully develop and launch no less than one of two missions within 10% of budget and schedule.

Performance indicators have been identified for two missions scheduled to launch in FY01. Indicators have also been established for other projects in development.

- Mars '01 Orbiter Development: Deliver for launch; successful launch and check-out.
- Genesis Development: Deliver for launch; successful launch and check-out.
- Rosetta Development: Deliver the flight units for the four U.S.-provided instruments or instrument subsystems to ESA.
- TWINS Development: Continue instrument development and deliver Flight Unit #1 for Integration and Test.
- CONTOUR Development: Successful CDR, meeting all program level requirements.
- Discovery Program Future Missions: New mission selection.

Target 1S5: Obtain expected scientific data from 80% of operating missions.

Performance indicators have been identified for nine operating missions. Indicators have also been established for other missions scheduled to launch in FY01; these indicators are to be utilized upon successful launch.

- ISTP Operations: Continue to collect 85% of data acquired from the ISTP spacecraft and successfully execute the Wind trajectory plan.
- Cassini Operations: Complete development, test, and load Attitude and Articulation Control Subsystem flight software version A8.0; complete development, test, and load Command and Data Subsystem software version V9.0.
- Voyager Operations: Upload overlay command messages to Voyager 1 quarterly; record plasma wave data weekly (Voyager 1 and 2); return science data 10 hours per day .
- Ulysses Operations: Capture at least 90% of available Ulysses science data. These will be the only data observed from outside-of-the-ecliptic plane.
- SAMPEX Operations: Obtain at least 60% data coverage from at least three of SAMPEX's four instruments.
- FAST Operations: Simultaneously gather particle and fields data during 75% of its high altitude encounters with the northern hemisphere auroral zone and 25% of its high altitude encounters with the southern hemisphere auroral zone; successfully deliver at least 85% of these data.
- TRACE Operations: Conduct solar observing operations during all orbits where EUV images of the sun can be obtained using a 5-day-per-week/8-hour-per-day planning and operations cycle; deposit all TRACE data products into a web-based data system.
- Stardust Operations: Earth flyby for gravity assist.
- Mars Global Surveyor (MGS) Operations: Complete primary mapping mission.
- TIMED Operations: One complete season (at least 90 days) of successful data collection at the required resolution and accuracy.
- HESSI Operations: Obtain hard-X-ray images of solar flares with angular resolution approximately 2 arcseconds and energy resolution approximately 1 keV (kilo-electron volts); obtain high-resolution X-ray and gamma-ray spectra of solar flares with approximately 1 keV energy resolution to energies as high as 20 MeV (million electron volts).
- IMAGE Operations: Acquire measurements at minute time scales, returning 85% real-time coverage of the Earth's magnetospheric changes; perform routine pipeline processing of browse products and deliver to the National Space Science Data Center (NSSDC) within 72 hours.
- Genesis Operations: If launched, start operations, insert spacecraft into L-1 halo orbit and start science phase.
- Mars '01 Orbiter Operations: Successfully perform required trajectory correction maneuvers and planned instrument checkout activities.

Target 1S6: Perform innovative scientific research and technology development by meeting technology development objectives for major projects, by achieving mission success in space physics rocket and balloon flights, and by making satisfactory research progress in related R&A and DA programs.

Performance indicators have been drawn from technology development objectives for three missions, as well as for future mission sets and for specific multi-mission technology development efforts. Indicators have also been established for achievement of mission success for space physics rocket and balloon flights and research progress in the R&A and DA programs.

- Solar-B Technology Development: Deliver engineering model of the optical telescope and x-ray telescope.
- STEREO Technology Development: Successfully complete Phase B effort including Confirmation Review.
- Solar Probe Technology Development: Begin Solar Probe prototype thermal shield fabrication.
- Future ST Probes Technology Development: Complete preliminary concept definitions for spacecraft systems and instruments for Magnetospheric Multiscale.
- Future Deep Space Technology Development: Deliver X-2003 Level 1-3 Requirements Documents; define subsystem interfaces; demonstrate intermediate-level multi-functional structures (MFS); complete definition of system architecture; evaluate key risk areas and pass decision gates.
- CISM Technology Development: Demonstrate and deliver prototype advanced power transistor [0.35 micron SOI (Silicon On Insulator) CMOS (Complementary Metallic Oxide Semiconductor)]; demonstrate Active Pixel Sensor with advanced processing capabilities on a single chip.
- X-2000 Technology Development: Deliver engineering model and flight set of avionics.
- Sounding Rocket Flights: Achieve launch success rate of 80% for sounding rocket flights.
- Balloon Flights: Achieve launch success rate of 80% for balloon flights.

Target 1S7: Perform innovative scientific research and technology development by meeting interferometry technology development objectives and by making satisfactory research progress in related R&A programs.

Performance indicators have been drawn from technology development objectives for three missions. Indicators have also been established for the Keck Interferometer project and for achievement of research progress in the R&A program.

- SIM Technology Development: Complete System Requirements Review (SRR), initiate Phase B, and demonstrate stabilization for nulling to one nanometer.
- TPF Technology Development: Award architectural definition contracts, develop Request For Proposals (RFP) for second phase of industrial contracts, and test starlight nulling breadboard.
- ST-3 Technology Development: Successfully complete Preliminary Design Review (PDR); successfully complete project and spacecraft Critical Design Review (CDR).
- Keck Interferometer Technology Development: Combine 2 Keck telescopes; install first outrigger telescope.
- Research and Analysis: Issue NASA Research Announcement (NRA) for Research Opportunities in Space Science (ROSS).

Target 1S8: Perform innovative scientific research and technology development by meeting technology development objectives and by making satisfactory research progress in the related R&A program, including the Astrobiology program.

Performance indicators have been drawn from the technology development objectives for the Europa Orbiter. Indicators have also been established for achievement of research progress in the R&A program, including especially the Astrobiology program.

- Europa Orbiter Technology Development: Complete Preliminary Design Review (PDR).
- Astrobiology Research: High-priority studies identified in the Astrobiology Roadmap will be carried out, the National Astrobiology Institute will conduct institute-wide functions using internet/video conferencing capabilities (i.e., executive council meetings, science seminars, group collaborations, education/outreach), and Institute research publications will reflect its interdisciplinary nature.
- Research and Analysis: Issue NASA Research Announcement (NRA) for Research Opportunities in Space Science (ROSS).

Target 1S9: Continue and expand the integration of education and enhanced public understanding of science with Enterprise research and flight mission programs.

Performance indicators have been identified for education and public outreach efforts.

Education and Public Outreach: Successful achievement of at least six of the following eight objectives will be made.

- Every mission initiated in FY 2001 will have a funded education and outreach program with a comprehensive education and outreach plan prepared by its PDR.
- By the end of FY01, 10 percent of all research grants will have a funded education and outreach program underway.
- Enterprise-funded education and outreach activities will be in planning or implementation in at least 34 states.
- At least five Enterprise-funded research, mission development or operations, or education projects will be underway in Historically Black Colleges and Universities, Hispanic Serving Institutions, and Tribal Colleges, with at least one being underway in an institution of each type.
- The Enterprise will provide exhibits, materials, workshops, and personnel at a minimum of five national and three regional education and outreach conferences.
- At least five major Enterprise-sponsored exhibits or planetarium shows will be on display or on tour at major science museums or planetariums across the country.
- The first comprehensive Space Science Enterprise Education/Outreach Report will be prepared that describes participants, audiences, and products for Enterprise education and outreach programs.
- Initial results of a pilot assessment of the Enterprise's approach to education and outreach will be available for determining whether adjustments in program direction or organization are needed.

Target 1S10: Investigate the composition, evolution, and resources of Mars, the Moon, and small bodies by successfully launching a Mars mission, by obtaining data from operational spacecraft, and by making satisfactory progress in related R&A and DA programs.

Performance indicators have been identified for the Mars '01 Orbiter, scheduled to launch in FY01, and for a Discovery mission scheduled to be in development. Other indicators have also been identified for an operating mission, as well as for achievement of research progress in related R&A and DA programs.

- Mars '01 Orbiter: Deliver for launch, within 10% of planned development budget and schedule; successful launch and check-out.
- CONTOUR Development: Successful CDR, to document that the design meets all program level requirements.
- Mars Global Surveyor Operations: Complete primary mapping mission.
- Research and Analysis: Issue NASA Research Announcement (NRA) for Research Opportunities in Space Science (ROSS).

Target 1S11: Develop the knowledge to improve the reliability of space weather forecasting by obtaining scientific data from three of five missions and by making satisfactory progress in related areas in R&A and DA programs.

Performance indicators have been identified for four operating missions. Indicators have also been established for another mission scheduled to launch in FY01 (to be utilized upon successful launch), as well as for achievement of research progress in the R&A and DA programs.

- ISTP Operations: Continue to collect 85% of data acquired from the ISTP spacecraft and successfully execute the Wind trajectory plan.
- ACE Operations: Measure the composition and energy spectra of heavy nuclei in six solar energetic particle events; measure the frequency and composition of coronal mass ejection events during the year; maintain real-time solar wind data 90% of the time.
- SAMPEX Operations: Obtain at least 60% data coverage from at least three of SAMPEX's four instruments.
- TRACE Operations: Conduct solar observing operations during all orbits where EUV images of the sun can be obtained using a 5-day-per-week/8-hour-per-day planning and operations cycle; deposit all TRACE data products into a web-based data system.
- HESSI Operations: Obtain hard-X-ray images of solar flares with angular resolution approximately 2 arcseconds and energy resolution approximately 1 keV (kilo-electron volts); obtain high-resolution X-ray and gamma-ray spectra of solar flares with approximately 1 keV energy resolution to energies as high as 20 MeV (million electron volts).
- Research and Analysis: Issue NASA Research Announcement (NRA) for Research Opportunities in Space Science (ROSS).

Target 1S12: Plan, develop, and validate new technologies needed to enable future research and flight missions by achieving performance objectives in core technology programs and by making progress as planned in the Flight Validation program.

Performance indicators have been identified for core technology programs (information systems, intelligent systems, high performance computing, and Explorer program technology), as well as for the Flight Validation program.

- Information Systems: Demonstrate Virtual Observatory capability from investigator workstation for multi-wavelength discovery, analysis, and visualization across collective set of space and ground astronomical surveys; demonstrate a Virtual Mars capability simulating rovers navigating Mars terrain, for planning and design of future Mars missions.
- Intelligent Systems: Awards will be made at the beginning of the 2001 program year. A second research opportunity cycle will begin in late 2001, targeted toward a second set of awards in mid-2002.
- High Performance Computing: Demonstrate a real-time capability with software-implemented fault tolerance for embedded scalable computers. Real-time performance latencies of less than 20 milliseconds are to be sustained at fault rates characteristic of deep space and low-Earth orbit (LEO).
- Explorer Program Technology: Complete 45 Explorers Technology Investigations selected in FY99. Implement awards for additional investigations planned for selection in FY00.
- Flight Validation: Complete ST-5 CDR.

New Initiative

Living With a Star: Further understanding of basic natural processes and the effects of solar variability on humans and technology.

Performance indicators have been established for Living With a Star.

- Strategic Plan: Complete Living With a Star Strategic Plan, including mission architecture, for the OSS Strategic Plan.
- Solar Dynamics Observatory: Complete definition study for the Observatory, the first major new flight mission for Living With a Star.
- Research & Data Analysis: Initiate targeted data analysis and modeling research grants program.